

**FEDERAL STATE BUDGET EDUCATIONAL  
HIGHER EDUCATION INSTITUTION  
"ROSTOV STATE MEDICAL UNIVERSITY"  
MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION**

**FACULTY OF TREATMENT AND PREVENTION**

Appraisal Fund  
in the discipline "Functional diagnostic methods in cardiology"

Specialty 05/31/01 General Medicine

**1. List of competencies formed by the discipline (in full or partially)\***

***general professional (OPK):***

Code and name general professional competence	Indicator(s) of achieving general professional competence
PK-5	Willingness to collect and analyze patient complaints, anamnesis data, examination results, laboratory, instrumental, pathological-anatomical And other research for recognition condition or establishing the presence or absence of a disease

**2. Types of assessment materials in accordance with the competencies being developed**

Name competencies	Types of assessment materials	number of tasks <b>for 1 competency</b>
PK-5	Closed tasks	25 with sample answers
	Open type tasks:	75 with sample answers
	Situational tasks Interview Questions	

PC-5:

Closed type tasks:

Task 1. Instructions: Choose one correct answer. How is the maximum heart rate calculated when performing PFN: A) based on the patient's weight;

B) 220 - patient's age; C) according to concomitant pathology; D) by gender.

Standard answer: B) 220 - patient's age

Task 2. Instructions: Choose one correct answer. The most common causes of decreased blood pressure during PFN:

A) activation of the SAS;

B) stenosing coronary atherosclerosis; C) diseases of the thyroid gland;

D) taking medications.

Standard answer: B) 220 - stenosing coronary atherosclerosis.

Task 3. Instructions: Choose one correct answer.

The patient, when performing PFN, refused to continue the study, the sample is considered: A) negative;

B) doubtful;

C) unfinished;

D) positive.

Sample answer: C) incomplete.

Task 4. Instructions: Choose one correct answer.

When performing PFN, an ST segment depression of 2 mm appeared on the ECG, there were no complaints, blood pressure and heart rate corresponded to the load, the test is considered:

- A) negative;
- B) doubtful;
- C) unfinished;
- D) positive.

Standard answer: D) positive.

Task 5. Instructions: Choose one correct answer.

When performing PFN, the patient developed discomfort in the chest without signs of ischemia on the ECG, the test is considered:

- A) negative;
- B) doubtful;
- C) unfinished;
- D) positive.

Sample answer: B) doubtful

Task 6. Instructions: Choose one correct answer. To perform PTEX, the following equipment is sufficient:

A) multichannel computer electrocardiograph, pacemaker, special diagnostic electrode, defibrillator; a laryngoscope, air ducts and a set of medications necessary for conducting research and providing emergency care to the patient;

B) multichannel computer electrocardiograph, pacemaker, special diagnostic electrode, defibrillator;

C) multichannel computer electrocardiograph, pacemaker, set of medications necessary for conducting research and providing emergency care to the patient;

D) TEE does not require special equipment, a multichannel computer electrocardiograph and a special diagnostic electrode are sufficient.

Reference answer: A) multichannel computer electrocardiograph, pacemaker, special diagnostic electrode, defibrillator; laryngoscope, air ducts and a set of medications necessary for conducting research and providing emergency care to the patient.

Task 7. Instructions. Choose one correct answer. VFSAU (recovery time of sinoatrial node function) is:

A) the interval from the P wave of the last spontaneous contraction before the application of atrial stimulation to the beginning of the P wave caused by an impulse from the SAU after TEE; B) the interval from the last artifact of the electrical impulse of the stimulator to the beginning of the P wave caused by the impulse from the ACS;

C) the interval from the first artifact of the electrical impulse of the stimulator to the beginning of the P wave caused by the impulse from the ACS;

D) the interval from the last artifact of the electrical impulse of the stimulator to the beginning of the P wave of the fifth impulse emanating from the ACS.

Sample answer: B) the interval from the last artifact of the electrical impulse of the stimulator to the beginning of the P wave caused by the impulse from the ACS.

Task 8. Instructions: Choose one correct answer.

Corrected time for recovery of sinoatrial node function (CRRT) is defined as:

- A) the difference between the maximum duration of the post-stimulation pause and the duration of the last cardiac cycle before TEE;
  - B) the difference between the maximum duration of the post-stimulation pause and the average duration of the 5 initial cardiac cycles;
  - C) the difference between the maximum duration of the post-stimulation pause and the average duration of 10 initial cardiac cycles;
  - D) the difference between the average duration of 10 cardiac cycles after TEE and the average duration of 10 initial cardiac cycles;
- Standard answer: C) the difference between the maximum duration of the post-stimulation pause and the average duration of 10 initial cardiac cycles.

Task 9. Instructions: Choose one correct answer. Medical cardiac denervation (MDS) is carried out using: A) beta blockers;

- B) alpha blockers;
  - C) beta and alpha blockers;
  - D) beta blockers and M-anticholinergics.
- Sample answer: D) beta blockers and M-anticholinergics.

Task 10. Instructions: Choose one correct answer. The advantages of TEE over other stress tests are that when exposed to stimulation:

- A) there is a simultaneous increase in heart rate and blood pressure;
- B) only an increase in heart rate occurs;
- C) only an increase in blood pressure occurs;
- D) coronary insufficiency can be provoked with unchanged values of blood pressure and heart rate

Standard answer: B) only an increase in heart rate occurs.

Task 11. Instructions: Choose one correct answer. TEE as a stress test is the method of choice in patients with: A) damage to the musculoskeletal system and bronchopulmonary system; B) damage to the urinary system and cardiovascular system; C) in patients with obesity and endocrine pathology; D) in patients in the acute period of myocardial infarction to assess myocardial viability.

Sample answer: A) damage to the musculoskeletal system and bronchopulmonary system.

Task 12. Instructions: Choose one correct answer. Instructions: Absolute indications for therapeutic TEE include: A) sinus tachycardia with a heart rate of more than 120 per minute; B) permanent form of atrial fibrillation, tachysystolic form; C) Morgagni-Adams-Stokes attack against the background of third degree AV block; D) new-onset atrial fibrillation.

Sample answer: C) Morgagni-Adams-Stokes attack against the background of third-degree AV block.

Task 13. Instructions: Choose one correct answer. An increase in which indicator throughout life underlies the mechanism of increase in pulse arterial pressure

- A) Stiffness coefficient of arterioles and capillaries;
- B) Stiffness coefficient of large arteries of the muscular type;
- C) Myocardial masses of the left ventricle of the heart;
- D) Minute volume of blood flow;

Standard answer: B) Stiffness coefficient of large arteries of the muscular type.

Task 14. Instructions: Choose one correct answer.

Due to the high variability of DBP at night, which of the limits presented below can be used for correct interpretation and results?

- A) 8 mm. Hg Art.;
- B) 12 mm. Hg Art.;
- C) 16 mm. Hg Art.;
- D) 20 mm. Hg Art.

Standard answer: B) 12 mm. Hg Art..

Task 15. Instructions: Choose one correct answer.

What average daily pulse blood pressure value is most typical for patients at high risk of cardiovascular events?

- A) 13 mm. Hg Art.;
- B) 25 mm. Hg Art.;
- C) 33 mm. Hg Art.;
- D) 53 mm. Hg Art.;

Standard answer: D) 53 mm. Hg Art.

Task 16. Instructions: Choose one correct answer.

It is possible to determine the effectiveness of antihypertensive therapy after at least

- A) 5 successful measurements within every hour;
- B) 20 measurements in the daytime per day;
- C) 50 measurements at night and daytime per day;
- D) 2 successful measurements within every hour;

Standard answer: D) 2 successful measurements within every hour.

Task 17. Instructions: Choose one correct answer.

Fluctuations in the values of the daily blood pressure index within 10-20% are typical for the following type(s) of patient(s)

- A) dipper;
- B) night-peaker;
- C) non-dipper;
- D) over-dipper;

Sample answer: A) dipper.

Task 18. Instructions: Choose one correct answer. The most accurate characteristic of the time index is:

- A) determines the percentage of time during which blood pressure values exceed the critical ("safe") level;
- B) determines the percentage of time during which blood pressure exceeds the threshold level in the morning time interval;
- C) determines the percentage of time that BP exceeds the threshold level only during sleep;
- D) determines the percentage of measurements in which blood pressure values exceed the threshold level only during physical activity;

The standard answer: A) determines the percentage of time during which blood pressure values exceed the critical ("safe") level.

Task 19. Instructions: Choose one correct answer.

Standard indicators of ABPM include

- A) The magnitude of the morning rise in blood pressure;
- B) Hypotension time index;
- C) Hourly average values of blood pressure and heart rate;
- D) The rate of morning rise in blood pressure;

Sample answer: C) Hourly average values of blood pressure and heart rate.

Task 20. Instructions: Choose one correct answer. The level of the maximum value of the morning rise in DBP is A) 10-15 mm. Hg Art.;

- B) 10-25 mm. Hg Art.;
- C) 30-36 mm. Hg Art.;
- D) 45-52 mm. Hg Art.;

Standard answer: C) 30-36 mm. Hg Art.

Task 20. Instructions: Choose one correct answer. The rate of morning rise in SBP is maximum equal to

- A) 5 mm. Hg st./hour;
- B) 10 mm. Hg st./hour;
- C) 15 mm. Hg st./hour;
- D) 20 mm. Hg st./hour;

Standard answer: B) 10 mm. Hg Art./hour

Task 21. Instructions: Choose one correct answer.

The necessary conditions for carrying out correct measurements in M-mode are all except:

- A) adequate visualization of the endocardium, myocardium, and valve structures;
- B) maintaining a 90 degree angle between the cursor and the structures being examined;
- C) maintaining an angle of 270 degrees between the cursor and the structures being examined;
- D) application of anatomical M-mode

Standard answer: C) maintaining an angle of 270 degrees between the cursor and the structures being studied;

Task 22. Instructions: Choose one correct answer.

- A) A pulsed wave Doppler study is characterized by: A) it allows one to evaluate the speed of blood flow throughout the entire length of the ultrasound beam;
- B) used to assess ventricular diastolic function;
- C) used to calculate pressure in the cavities of the heart;
- D) is used to determine the direction of regurgitant flow.

Standard answer: B) is used to assess ventricular diastolic function//

Task 23. Instructions: Choose one correct answer. Continuous-wave Doppler studies are characterized by: A) allowing one to estimate the speed of blood flow at a specific point;

- B) used to study transmitral blood flow to assess ventricular diastolic function;

C) used to calculate LVEF;

D) is used to determine the velocity and other parameters of valvular regurgitation.

Sample answer: D) is used to determine the speed and other parameters of the valve regurgitation.

Task 24. Instructions: Choose one correct answer. The main application of color Doppler mapping in ECG: A) is used to study transmitral blood flow to assess ventricular diastolic function;

B) used to determine the direction of regurgitant flow;

C) allows you to identify the presence of zones of local contractility impairment;

D) allows you to identify areas of local contractility impairment.

Sample answer: B) is used to determine the direction of regurgitation flow

Task 25. Instructions: Choose one correct answer. Tissue pulsed doppler is used for:

A) studies of transmitral blood flow;

B) assessment of mitral regurgitation;

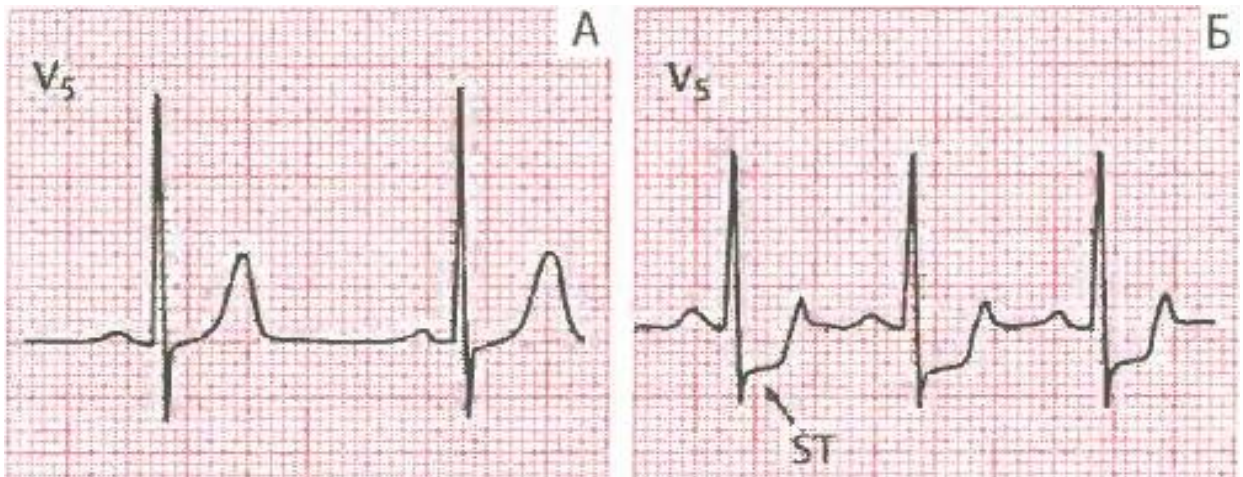
C) assessment of LV diastolic function;

D) calculation of pressure in the pulmonary artery.

Standard answer: C) assessment of LV diastolic function.

Open type tasks:

Exercise 1.



A - initial ECG, B - ECG during the test.

A 48-year-old patient complained of chest discomfort that arose during an exercise test.

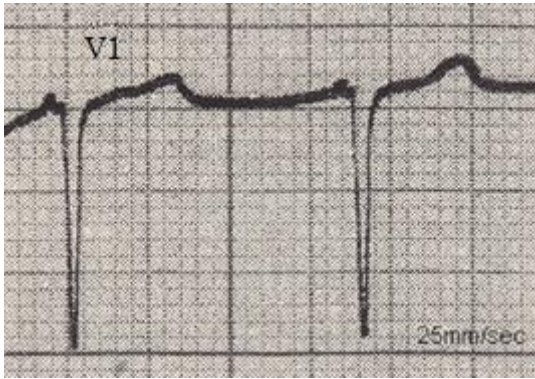
1. What do changes on the ECG indicate?
2. What other changes can be observed during the test?

Sample answer:

1. On the ECG (B), a classic sign of myocardial ischemia is ST segment depression.
2. Tall, pointed T waves may appear as a nonspecific sign of myocardial ischemia

Task 2.





Before employment, an ECG was performed on a 30-year-old patient.

1. Specify the pathological changes in the ECG.
2. What is this condition called?

Standard answer.

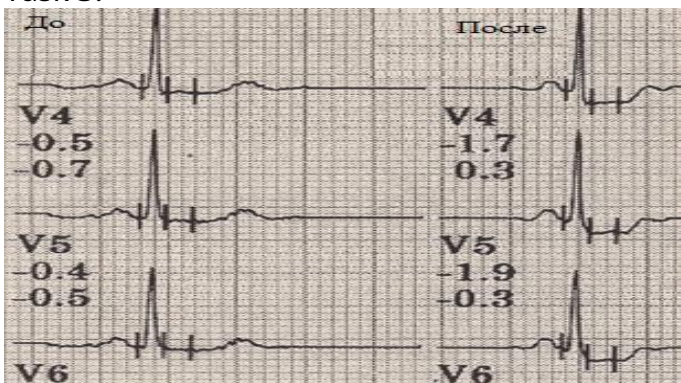
1. The following pathological changes are recorded:

- Short PQ interval, less than 0.12 sec
- Narrow QRS complexes
- Absence of delta wave on QRS

2. Against the background of repeated paroxysms of SVT

this condition is known as Lown-Ganong-Levine syndrome

### Task 3.



A 47-year-old patient completed a stress test without complaints.

1. Indicate the main pathological sign on the ECG.
2. Is this stress test positive?

Standard answer.

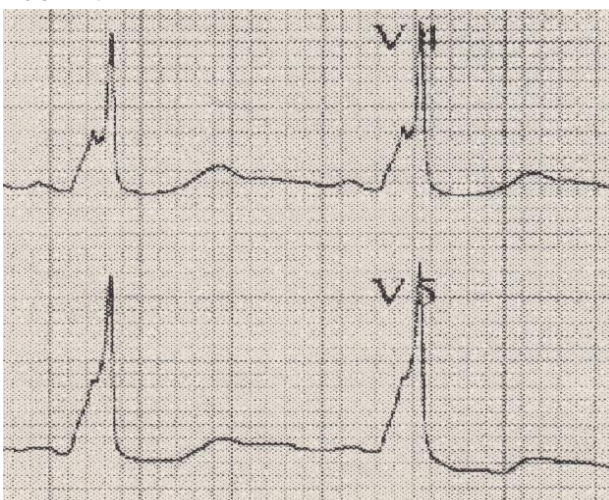
1. Horizontal depression of the ST segment is recorded in V4-V6, the PQ interval corresponds to the isoline, the distance from the J point is 80 ms.

Three perpendicular lines mean:

- The PQ interval corresponds to the isoline from which the ST segment depression is measured;
- Point J is the beginning of the 80 ms period;
- End of the 80 ms period during which ST segment depression can transition to ventricular repolarization.

2. This stress test is positive according to ECG criteria. Clinical criteria can be used to evaluate the test if ECG data is not available or is inconclusive.

### Task 4.



An 18-year-old boy has been suffering from heart attacks since childhood, which have become more frequent recently.

1. Indicate changes in the ECG.
2. What is this syndrome called?

Response standard

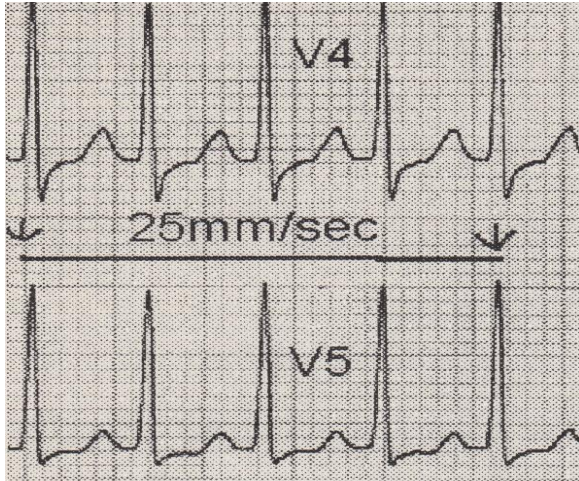
1. Pathological changes:

- Shortening the PQ interval (less than 0.12 sec)
- Delta wave on the rising portion of the QRS complex in V1 makes it look like complete RBBB

2. Wolff-Parkinson-White syndrome (WWS), type A. This syndrome is still called premature ventricular excitation syndrome.



### Task 5.



A 24-year-old patient developed collapse while playing football.

1. Determine the type of heart rhythm disorder.
2. What measures should have been taken for this patient?

Sample answer:

#### 1. SVT:

- QRS complexes are narrow and normal in shape;
- The rhythm is correct;
- P waves are not recorded;
- Heart rate is very high (with sinus tachycardia no more than 140 per minute).

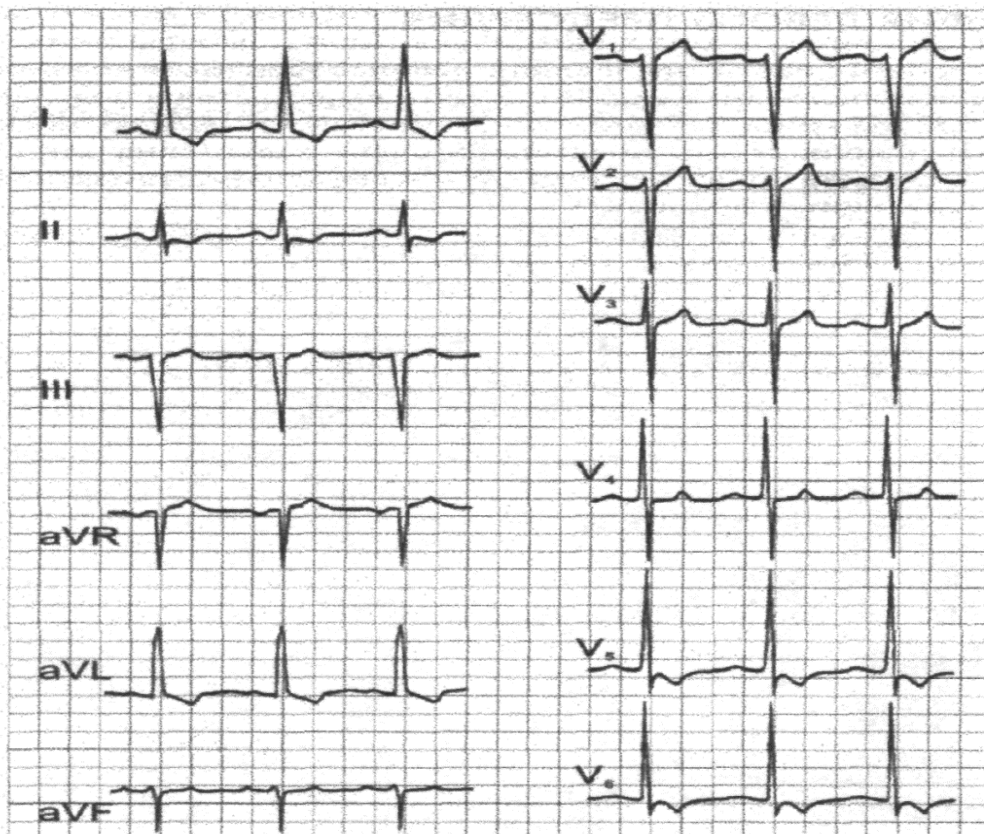
#### 2. Therapy must begin with

performing vagal tests. Vagal tests are methods of physical influence aimed at increasing the tone of the vagus nerve, which suppresses the activity of arrhythmia:

- Valsalva test (breath holding with sudden straining);
- Stimulation of the gag reflex by pressing on the root of the tongue;
- Massage of the carotid sinus (sharp and strong pressure in the area of the angle of the lower jaw).

### Task 6.

Patient, 55 years old, smoker, is being treated by a gastroenterologist for GERD, does not feel any improvement: pain in the chest persists, blood pressure is 160/90, considers it "working" (does not receive therapy), ECG done:



#### 1. Describe ECG

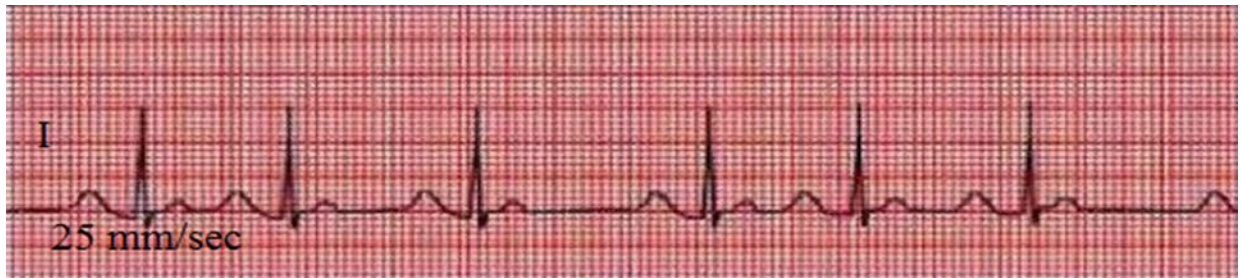
## 2. What diseases need a differential diagnosis?

Standard answer.

1. Severe LV hypertrophy: levogram, high R waves in leads V5 and V6, depression of the ST segment there.
2. Considering the patient's risk factors: male gender, age, smoking, untreated hypertension, presence of target organ damage, coronary insufficiency should be excluded.

### Task 7.

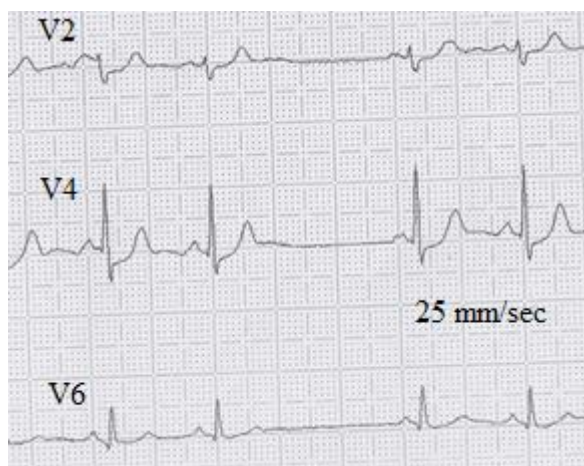
This ECG was recorded in a 20-year-old football player during a routine examination.



1. What is the cause of irregular heart rhythm? What are
2. the diagnostic criteria for this condition? What clinical
3. significance do the findings have?

Standard answer.

1. The subject was diagnosed with respiratory sinus arrhythmia (heart rate – 64-72 per minute).
2. Diagnostic criteria:
  - P wave of normal shape and size
  - Heart rate changes cyclically
  - Heart rate increases with inhalation and decreases with exhalation
  - Same PQ interval
  - QRS of normal form
3. Sinus arrhythmia is physiological.



### Task 8.

Sick 20 years is engaged severe athletics. During the next examination, the following ECG was recorded.

1. What ECG changes were detected?
2. What are the most common reasons for these changes?

Sample answer:

1. Transient SA blockade of the second degree, type II (without Samoilov-Wenckenbach periods) is recorded. After two QRS complexes with a preceding P wave, there is a sinus pause equal to 2 RR distances, there is no ectopic activity

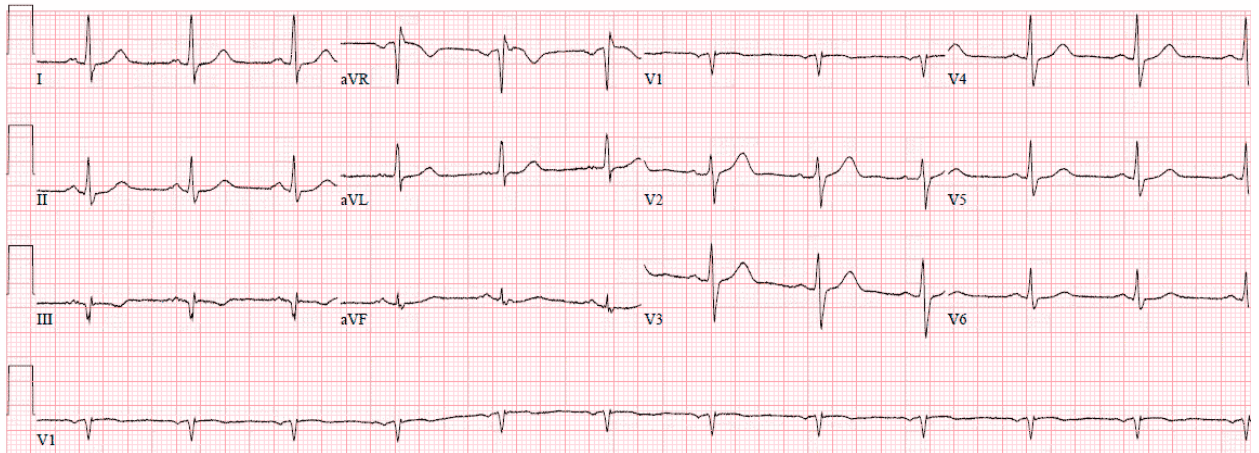
atria and ventricles. Depolarization of the SA node occurred, as evidenced by the appearance of the next P wave "strictly on schedule."

2. SA blockade is often physiological in trained patients. The cause of SA blockade can be inflammatory and degenerative diseases of the myocardium.

### Task 9.



A 45-year-old woman notes recurring pain in the chest of an unspecified nature, unrelated to physical activity, and her blood pressure periodically increases. She had a hysterectomy at age 35 and did not receive replacement therapy. She is being observed and treated by a therapist for postmenopausal syndrome. ECG done:

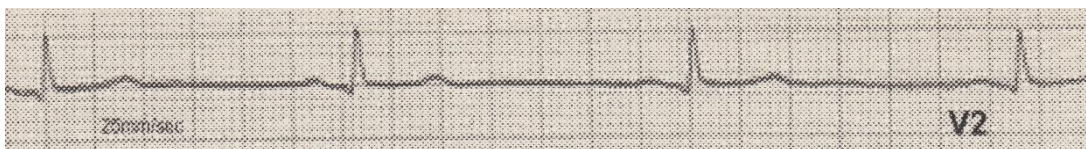


1. Formulate a preliminary diagnosis.
2. Decipher the ECG.
3. Schedule the necessary examination.

Sample answer:

1. Considering the presence of risk factors in the patient: "early" menopause, hypertension, recurring pain syndrome and lack of effect from the therapy, coronary insufficiency should be excluded. Diagnosis: IHD, angina pectoris FC 2.
2. The sinus rhythm is correct, the electrical axis is not deviated, repolarization processes are disrupted.
3. PFN is required.

Task 10.



A 45-year-old patient complained of dizziness during antihypertensive therapy.

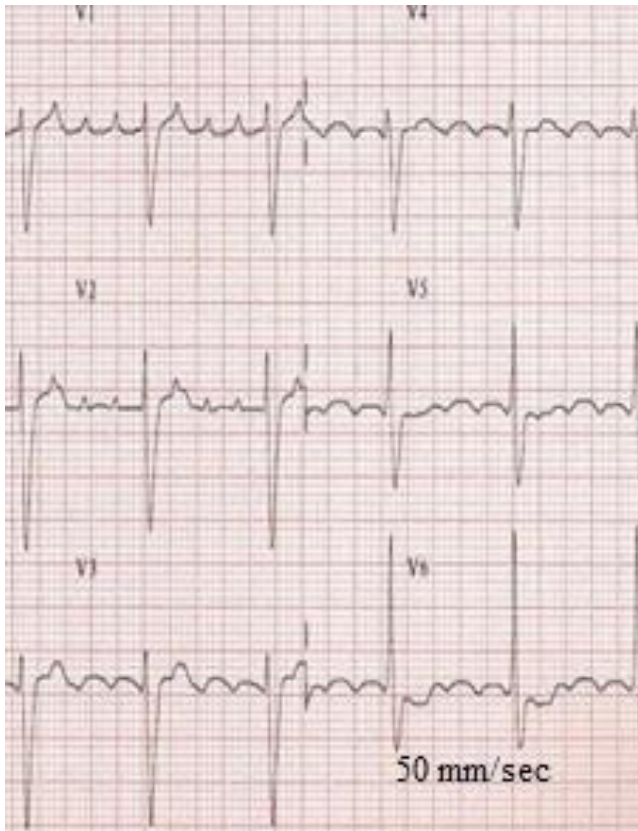
1. Determine your heart rate.
2. What is this type of rhythm called?
3. What medications could cause this.

Sample answer:

1. Heart rate 44 per minute. Heart rate calculation:  $300/6.8$ , where 6.8 is the number of large cells between RR
2. Sinus bradycardia:
  - The distance between QRS is the same
  - There is a P wave before each QRS
  - Heart rate is less than 60 per minute.
  - Normal QRS shape
3.  $\beta$ -blockers

Task 11.

A 32-year-old patient was diagnosed with mitral heart disease, mitral orifice stenosis.



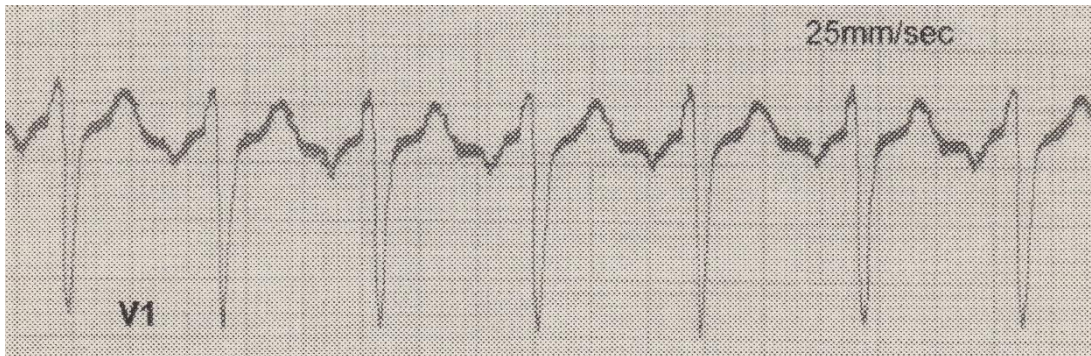
1. Determine your heart rate.
2. Give a rating violation heart rhythm.
3. What medicinal drugs necessary prescribe to the patient.

What is the tactics of drug therapy for rhythm disturbances in a patient?

Sample answer:

1. Heart rate 150 per minute.
2. Flutter atria (correct form):
  - Distance between QRS the same
  - Morphology of P waves: typical saw-tooth configuration in leads II, III, heart rate 250-350 per minute.
  - Tachycardia With narrow ventricular complexes.
3. Warfarin, cardiac glycosides. Anticoagulants, control with beta<sub>1</sub> heart rate With blockers, non-dihydropyridine calcium antagonists.

Task 12.



A 27-year-old patient was admitted to the hospital with a diagnosis of acute pneumonia.

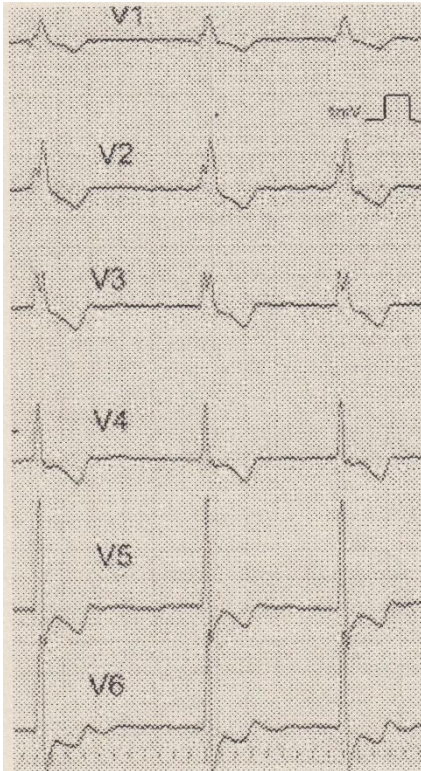
1. Determine your heart rate.
2. Give an assessment of the heart rhythm.
3. Indicate possible reasons for this rhythm.

Sample answer:

1. Heart rate 110 per minute. Heart rate calculation:  $300/2.8$ , where 2.8 is the number of large cells between RR
2. Sinus tachycardia:
  - The distance between QRS is the same
  - There is a P wave before each QRS
  - Heart rate is more than 90 per minute.
  - Normal QRS shape
3. Fever, pain, stress and dehydration.

Task 13.





A 75-year-old patient presented with a sharp increase in blood pressure to 220\120 mmHg. severe shortness of breath developed with a respiratory rate of 28 per minute, accompanied by moist wheezing with the discharge of foamy pink sputum.

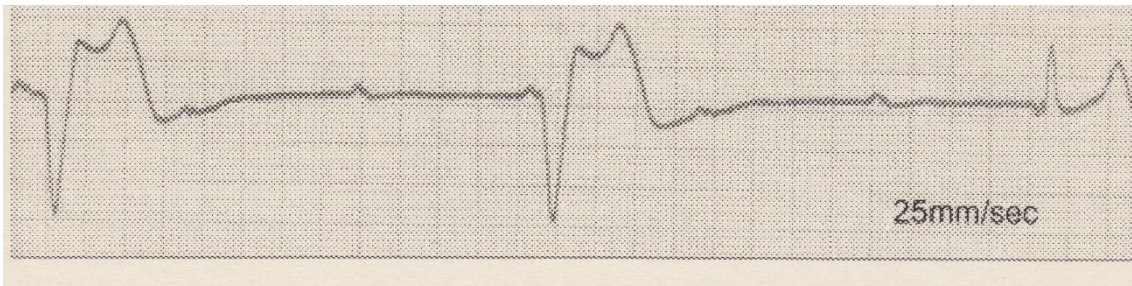
1. Give a clinical assessment of the patient's condition.
2. Determine the nature of the rhythm and conduction disturbance.
3. Assess for the presence or absence of LV hypertrophy.

Sample answer:

1. Pulmonary edema due to hypertension.
2. Atrial fibrillation and PNPG block. Atrial fibrillation on this ECG is indicated by different distances between the QRS and the absence of P waves. GI signs of PNPG block are a complex in leads V1, V2 of the RSR type, expansion of the QRS complex > 0.12 sec.
3. The patient has ECG signs of LVH:

- The R wave in V5, V6 is larger than the R wave in V4
- ST segment depression in V5, V6

#### Task 14.



An 82-year-old patient was admitted to the intensive care unit with an attack of loss of consciousness. An ECG was taken

1. Determine existing conduction disturbances and heart rate.
2. Why is the third QRS complex different from the first two?
3. Assess the patient's clinical condition taking into account ECG data and indicate the patient's management tactics.

Sample answer:

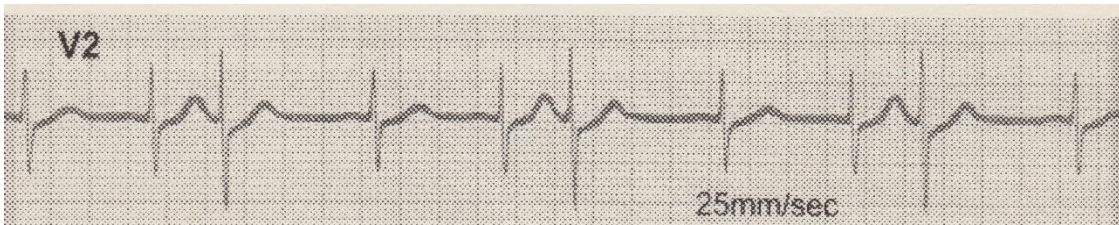
1. AV block of the third degree (complete, transverse):

- Regular P waves are completely dissociated from the QRS complex
  - Slow idioventricular rhythm (heart rate – 25 per minute)
2. Sources of ventricular excitation in third degree AV block – AV junction and/or ventricular conduction system:

- The first two QRS complexes formed in the lower ventricles
- Third QRS complex at the AV junction

3. Morgagni-Edams-Stokes syndrome. The patient is indicated for immediate implantation IVR

#### Task 15.



An ECG was performed on a patient in a state of strong emotional arousal.

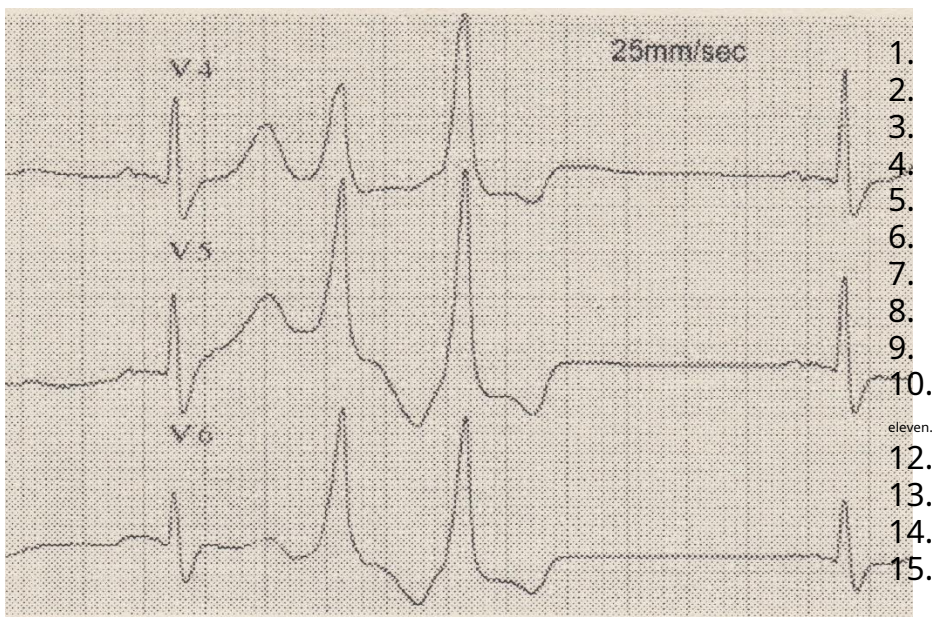
1. Assess the heart rhythm disturbance
2. List the ECG signs of supraventricular and ventricular extrasystoles.
3. Determine the tactics for managing the patient.

Sample answer:

1. Against the background of sinus rhythm, atrial extrasystole is determined:
2. Signs of supraventricular extrasystoles: premature QRS complexes with a P wave (not visible in this section of the ECG); unchanged QRS complex; the presence of an incomplete compensatory pause. Signs of ventricular extrasystoles: the appearance of premature QRS complexes; the P wave is absent before the extraordinary complex; widened, deformed QRS complex; the presence of a complete compensatory pause.
3. This type of rhythm disturbance does not require drug correction.

#### Task 16.

A 71-year-old patient suffering from coronary artery disease, post-infarction cardiosclerosis, complicated by chronic cardiac NKIIb, FC III (NYHA) with low ejection fraction (EF 25%) and receiving cardiac glycosides, an ECG was taken



1. Identify and justify pathological changes on the ECG
2. Do the changes detected on the ECG require correction of the baseline therapy.
3. Do these changes pose a danger to the patient's life? Sample answer:

1. Paired, polytopic ventricular extrasystoles:
  - Extraordinary appearance of the QRS complex
  - Absence of a preceding P wave
  - Widening of the QRS complex (> 0.12 sec)



- After the second extrasystole there is a compensatory pause.
- 2. The patient needs to stop taking cardiac glycosides. The "R to T" phenomenon is observed:
- 3. T" phenomenon is observed:
- Extrasystoles occur before the completion of the T wave
- There is a high risk of developing ventricular tachycardia

### Task 17.



A 16-year-old patient called the emergency room due to complaints of palpitations accompanied by shortness of breath. An ECG was recorded.

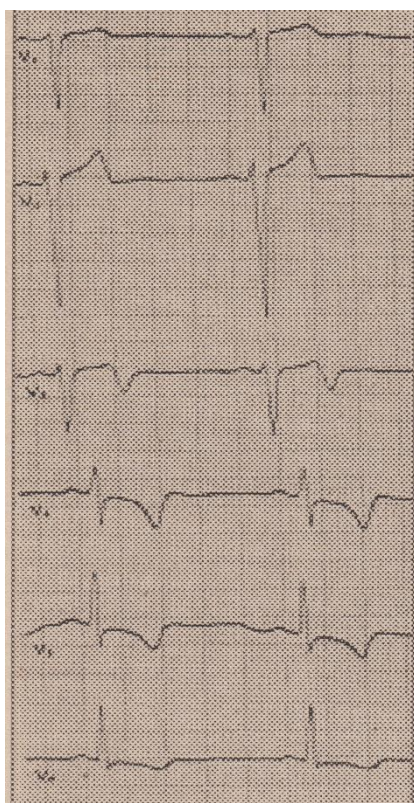
1. Determine and justify the nature of the heart rhythm disorder.
2. Specify the reason for the widening of the QRS complex.
3. What rhythm disturbance is necessary for a differential diagnosis? Sample answer:

1. Flutter atria With carrying out pulses 1:1
  - Prong P sawtooth configurations
  - Distance between ventricular complexes are the same because a constant number of impulses per minute arrives at the ventricles
  - ChSP and CV are equal to 270 per minute
2. Signs of complete RBBB

3. The ECG is similar to the ventricular form of paroxysmal tachycardia:

- With TP, the heart rate exceeds 220 per minute, with VT, the heart rate is less than 220 per minute
- Irritation of the vagus nerve does not change heart rate during VT and slows it down during AFL, making it easier to detect atrial F waves.

### Task 18.



The patient is 64 years old, has been suffering from hypertension for 10 years with maximum blood pressure values up to 180/100 mmHg and the target achieved 130/80 mmHg. At about 3 years old, he began to complain of periodic short-term pain in the heart area that occurs during physical activity (walking 200-300 m). Over the past few days, the pain has become more frequent, it began to occur when walking 50-100 m, and the amount of nitroglycerin consumed per day has increased. An ECG was recorded at the time of pain

1. Specify the possible cause of the patient's condition.
2. List the changes on the ECG.
3. What stage of hypertension can ECG data indicate?

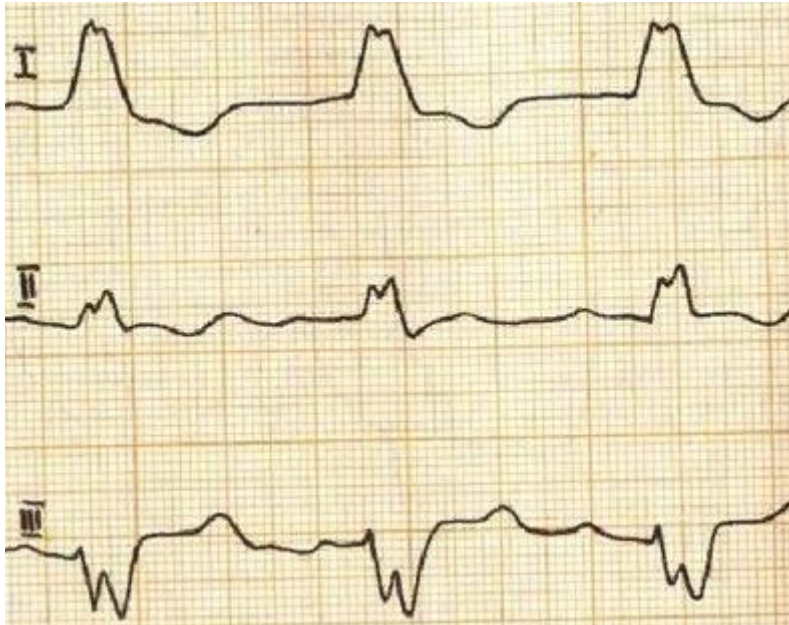
Sample answer:

1. IHD. Progressive angina pectoris
2. Signs of myocardial ischemia:
  - ST segment depression in V3-V6



- Biphasic T wave in V3
  - ST segment asymmetry in V4-V6
4. LVH. The R wave in V5, V6 is larger than the R wave in V4

Task 19.



This ECG was recorded in a 40-year-old man during a medical examination.

1. Draw a conclusion
2. What is the significance of the findings?

Sample answer:

1. LBBB:
  - Complex QRS is greater than 0.12 sec
  - RSR complexes in I
  - Segment ST discordant with respect to the QRS complex
3. LBBB is a very difficult diagnosis compared to her AMI

or myocardial ischemia. It is necessary to establish the cause of its occurrence.

Task 20.



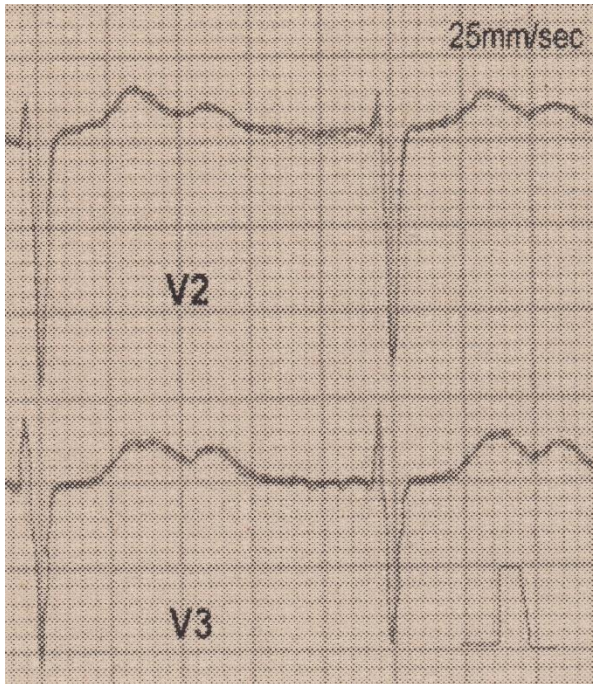
A 76-year-old patient was admitted to the hospital emergency department with complaints of chest pain. Suddenly lost consciousness.

1. Make an ECG conclusion.
2. What urgent measures need to be taken.

Sample answer:

1. Ventricular flutter:
  - Monomorphic ventricular complexes without isoline
  - Scallop configuration
  - Heart rate 240-300 per minute
2. For hemodynamic reasons (circulatory arrest), the patient is advised immediate defibrillation. In the future, in most cases, implantation of a cardioverter - defibrillator, support with antiarrhythmic drugs.

Task 21.



Patient 58 is in the infectious diseases department with severe diarrhea.

1. Make an ECG conclusion.
2. Indicate the main ECG signs of this pathology.
3. What other ECG changes are possible.

Sample answer:

1. Severe diarrhea may lead to hypokalemia

2. Signs of hypokalemia:

- Decreased T wave amplitude
- Presence of a U wave

3. Possible signs of hypokalemia:

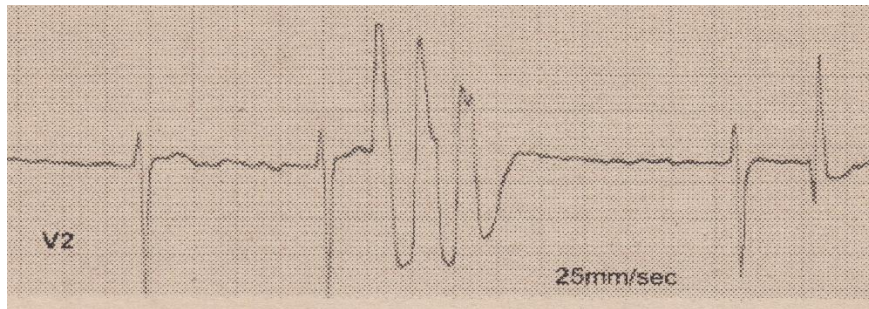
- Increase amplitudes

And

P wave duration

- ST segment depression
- Heart rhythm disturbance

Task 22.



A 71-year-old patient is being treated for CHF. Notes attacks of dizziness.

1. Set the type of ventricular arrhythmia
2. Set the type of atrial arrhythmia
3. What are the most likely causes of this pathology.

Sample answer:

1. Group polymorphic ventricular extrasystoles:

- The QRS complex is widened and irregularly shaped
- QRS complexes of different sizes

2. Atrial fibrillation:

- There is no P wave before the QRS complex
- Uneven contour

3. Probable causes of this pathology:

- A patient taking diuretics may have electrolyte disturbances.

exchange

- Glycoside intoxication.

Task 23.

A 53-year-old patient suffering from fibrosing alveolitis notes increased shortness of breath.

1. What changes are there on the ECG.
2. How they are related to his illness.
3. What other ECG changes are possible with this pathology.



Sample answer:

1. Complete RBBB:

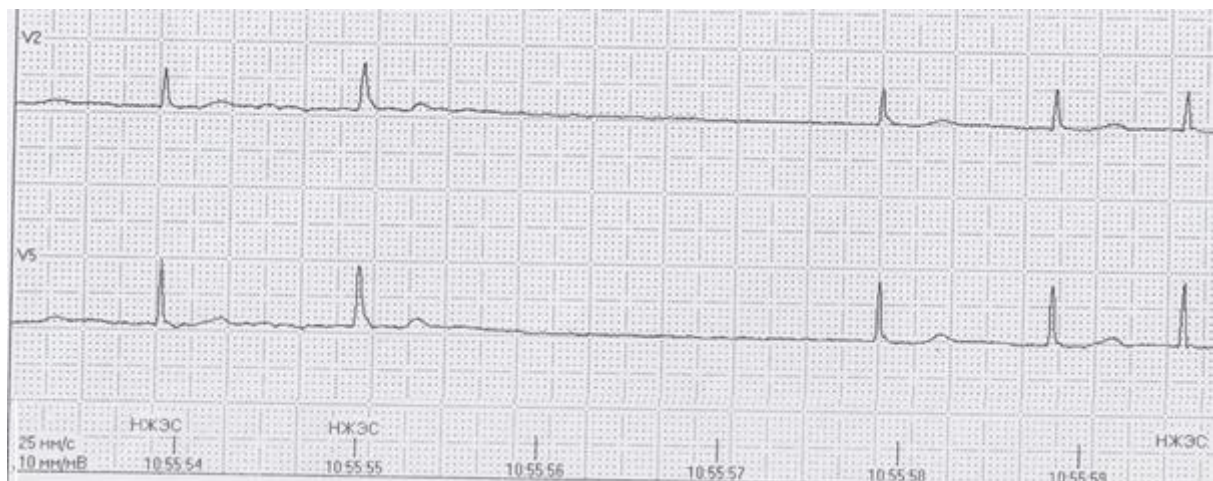
- QRS complex > 0.12 sec in all leads
- Disturbance of repolarization processes ventricles (ST segment and T wave changes)

- QRS configuration – the S wave is wider than the R wave in I, V6

2. Overload of the right side of the heart and the appearance chronic pulmonary heart disease against the background of chronic lung disease

3. Appearance of P-pulmonale in II, III, hypertrophy of the right ventricular myocardium

Task 24.



During a HM ECG, a 45-year-old patient received the following ECG.

1. Set the type of arrhythmia.
2. What happened after the second reduction.
3. What medications could cause this pathology?

Sample answer:

1. Atrial fibrillation:

- Irregular frequency, amplitude and wave pattern f
- Uneven contour
- Electrical alternans (differences in QRS complexes in the same lead)

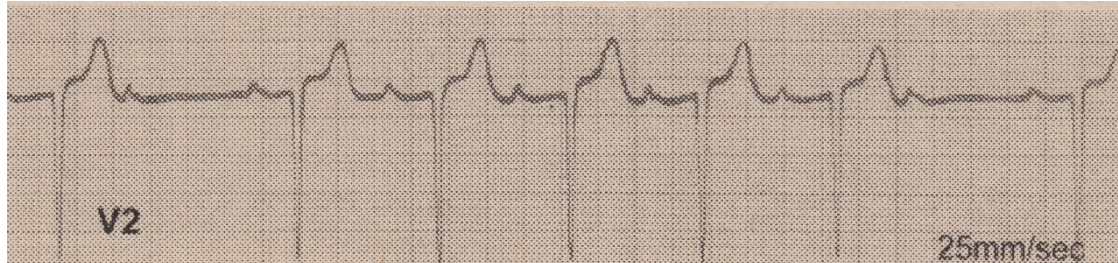


2. After the second QRS complex there is a long ventricular pause with absence of spontaneous ventricular rhythm

3. Medications that the patient may be taking:

- Amiodarone
- Verapamil
- B-blockers

Task 25.



A 52-year-old patient is regularly observed by a cardiologist in the clinic. During the next examination, the following ECG was recorded.

1. What type of conduction disturbance is observed?

2. What reasons could lead to this pathology?

Sample answer:

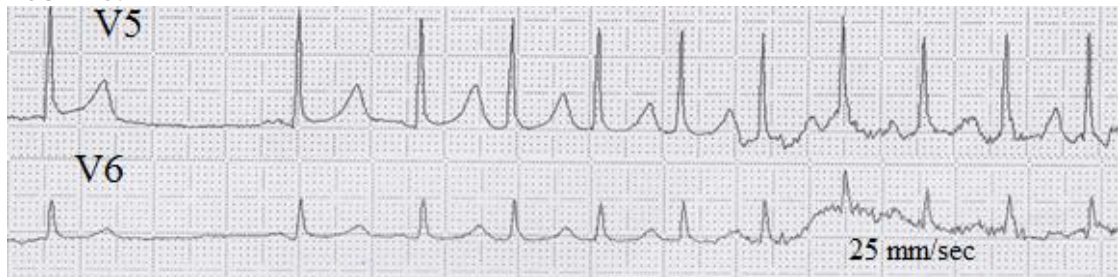
1. AV block II stage. (Mobitz I) with Samoilov-Wenckenbach periods:

- P waves present
- Progressive prolongation of the PQ interval
- There is a loss of QRS complexes after the longest PQ interval

2. Previous AMI:

- No R wave in V2
- Deep QS is noted in V2

Task 26.



A 14-year-old boy notes the appearance of attacks of palpitations that suddenly begin and end suddenly.

1. Set the type of arrhythmia.

2. Where should this patient begin therapy.

3. What medications are indicated if previously taken measures are ineffective.

4. What therapeutic measures should be taken if previous therapy is ineffective.

Sample answer:

1. Paroxysmal supraventricular tachycardia:

- The P wave before the QRS complexes merges with the preceding T wave
- QRS complexes are narrow
- Heart rate – 150 per minute

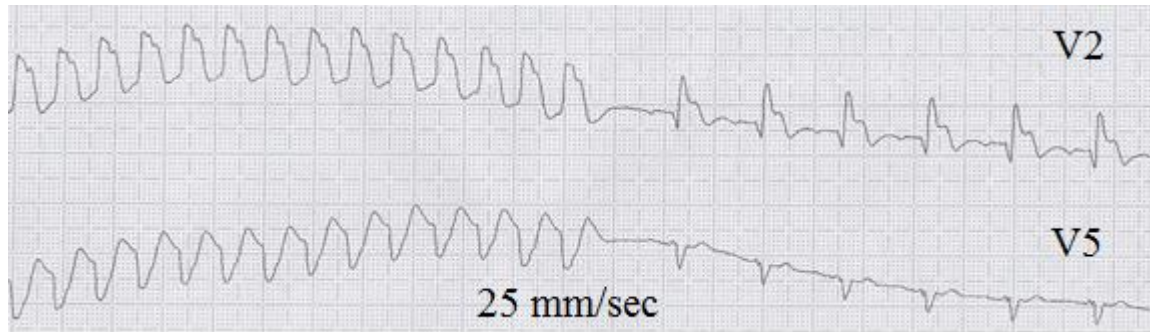
2. Therapy must begin with vagal tests. Vagal tests – methods of physical influence aimed at increasing the tone of the vagus nerve, which suppresses the activity of arrhythmia:

- Valsalva maneuver (breath holding with sudden straining)
- Stimulation of the gag reflex by pressing on the root of the tongue
- Massage of the carotid sinus (sharp and strong pressure in the area of the angle of the inferior jaws)

3. Adenosine – the drug of choice, verapamil

4. Cardioversion under anesthesia is a necessary measure in case of hemodynamic deterioration.

Task 27.



A 43-year-old patient who suffered an AMI underwent a HM ECG.

1. Specify the type of arrhythmia.
2. Describe the characteristic signs of arrhythmia.
3. Prescribe therapy.

Sample answer:

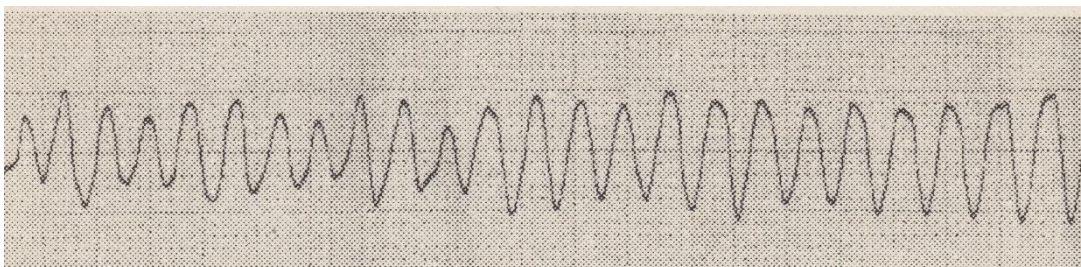
1. Paroxysmal VT

2. Signs of VT:

- Heart rate 200 per minute
- QRS more than 0.12 sec, irregular shape
- P wave dissociation

3. Antiarrhythmic drugs that have an antifibrillatory effect ( amiodarone,  $\beta$ -blockers), in most cases, implantation of a cardioverter-defibrillator is indicated.

Task 28.



A 50-year-old patient undergoing treatment in the cardiology department suddenly lost consciousness.

1. Set the type of arrhythmia.
2. What urgent measures are indicated.

Sample answer:

1. VT (not ventricular fibrillation). On the ECG, the QRS complexes are clear, however dilated and irregularly shaped
2. Bolus administration of lidocaine (preferably in the acute phase of AMI) and emergency cardioversion are indicated.

Task 29.



A 70-year-old patient complains of dizziness and notes periodic semi-fainting conditions.

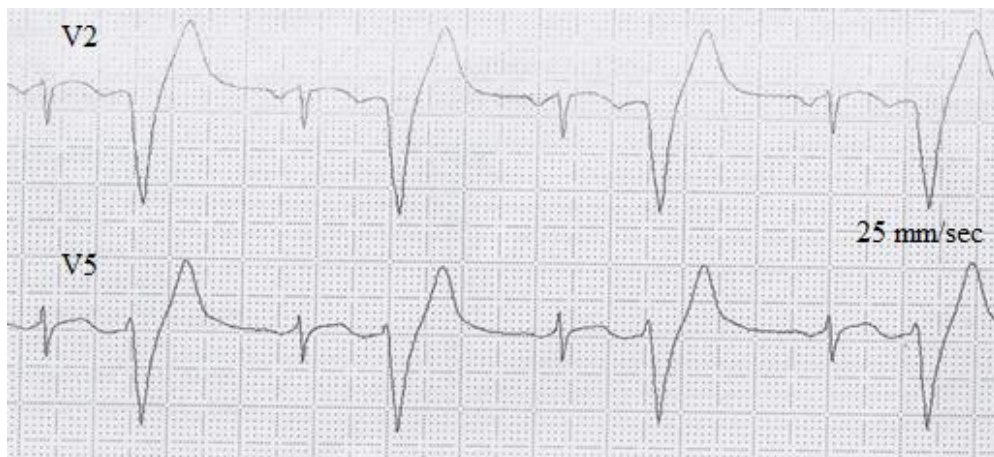
1. What heart rhythm disturbances are observed.
2. What are attacks of loss of consciousness called?
3. Describe the changes on the ECG.
4. Your treatment measures.

Sample answer:

1. Third degree AV block with complete AV dissociation
2. Morgani-Edams-Stokes attack (MES)
3. Complete separation of the excitation of the atria and ventricles, not a single P wave is associated with the QRS complex, heart rate 66 per minute, heart rate 35 per minute
4. Immediate pacemaker is indicated

Task 30.

During a clinical examination, this ECG was recorded in a 16-year-old boy



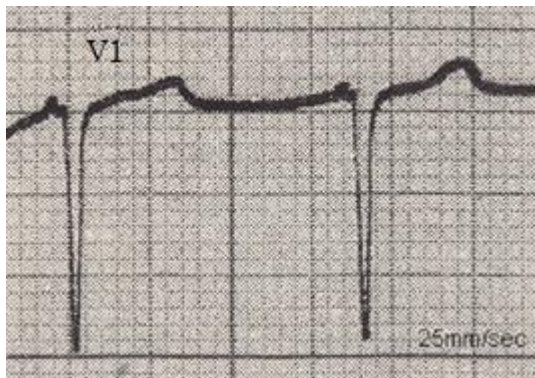
1. Set the type of arrhythmia.
2. Describe the ECG.
3. Decide on the management tactics for such a patient.

Sample answer:

1. Allorhythmia-ventricular bigeminy
2. A premature widened QRS complex without a P wave alternates with a rhythm from the sinus node (the usual configuration and width of the QRS complexes with a preceding P wave)
3. Examination to exclude cardiac pathology (defects, etc.). In young patients in puberty, arrhythmia may be idiopathic and does not require treatment.



Task 31.



Before employment, an ECG was performed on a 30-year-old patient.

1. Specify the pathological changes in the ECG.
2. What is this condition called?
3. What anatomical disorder underlies it.

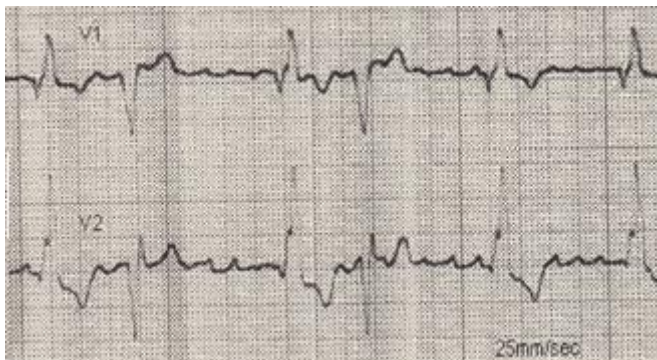
Sample answer:

1. Register following pathological changes:

- Short PQ interval, less than 0.12 sec
- Narrow QRS complexes

- Absence of delta wave on QRS
2. Against the background of repeated paroxysms of SVT, this condition is known as syndrome Launa-Ganonga-Levine
  3. In most cases, there is accelerated and increased impulse conduction from the sinus node through the AV node.

Task 32.



A 75-year-old patient suffers from coronary artery disease. Angina pectoris FC II-III CHF II A-B. The patient notes interruptions in the functioning of the heart.

1. Determine the type of arrhythmia.
2. Why are two types of QRS complexes recorded?

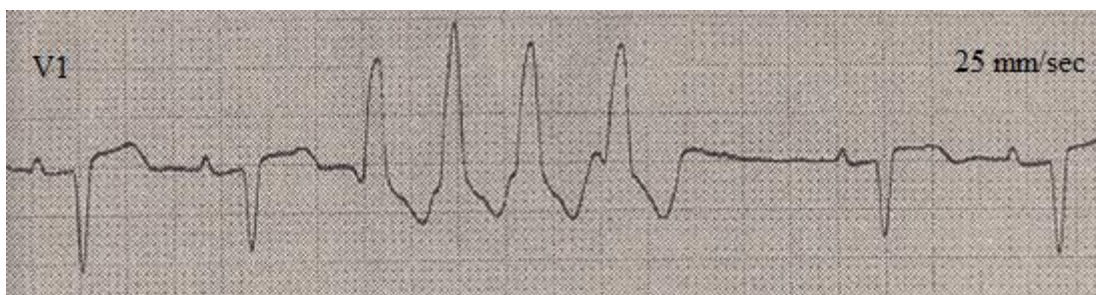
Sample answer:

1. TP and fickle full LBBB and RBBB. Flutter waves

the atria are clearly recorded at a rate of about 300 per minute. However, the response contractions of the ventricles are irregular

2. Variable bundle branch block is noted.

Task 33.



The patient is in the intensive care unit due to severe chest pain. He is undergoing thrombolytic therapy.

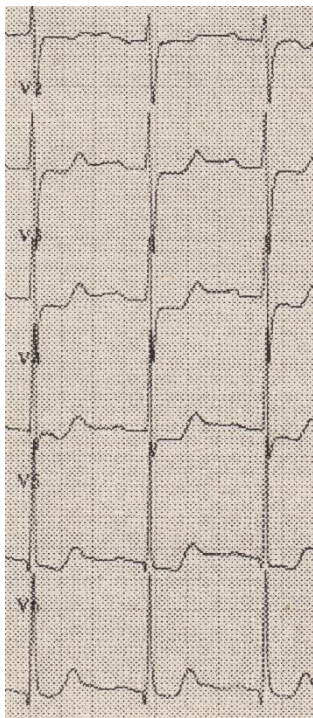
1. What causes chest pain.
2. Set the type of arrhythmia.
3. Is therapy adjustment needed?



Sample answer:

1. A patient with AMI of the anterior wall of the LV (QS wave in V1)
2. Against the background of sinus rhythm, a short burst of isolated, accelerated idioventricular rhythm
3. This is a reperfusion arrhythmia that occurred during thrombolytic therapy. These changes are a favorable prognostic sign that does not require specific treatment, excluding cases with high frequency and duration.

#### Task 34.



A 63-year-old patient is being treated in the gastroenterology department. During the endoscopic procedure, she complained of discomfort in the heart area.

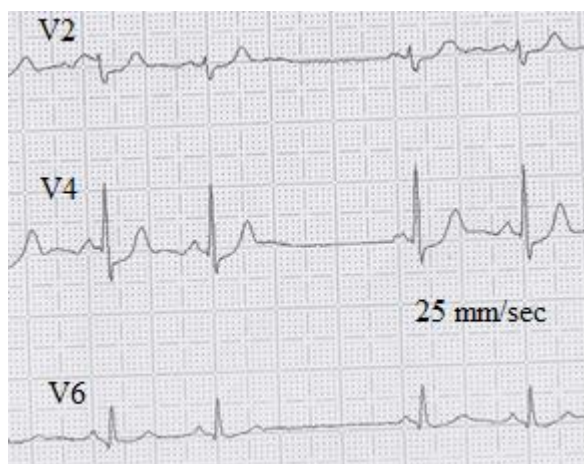
1. In which leads are pathological changes recorded?
2. Draw a conclusion.

Tactics for further management

Sample answer:

1. In leads V3, V4
2. There is a horizontal depression of the ST segment of about 2 mm, which indicates myocardial ischemia
3. The patient probably has angina pectoris, provoked by anxiety. The endoscopic procedure should be delayed and nitrates should be given. The patient needs dynamic ECG monitoring

#### Task 35.



The patient has been involved in weightlifting for 20 years. During the next examination, the following ECG was recorded.

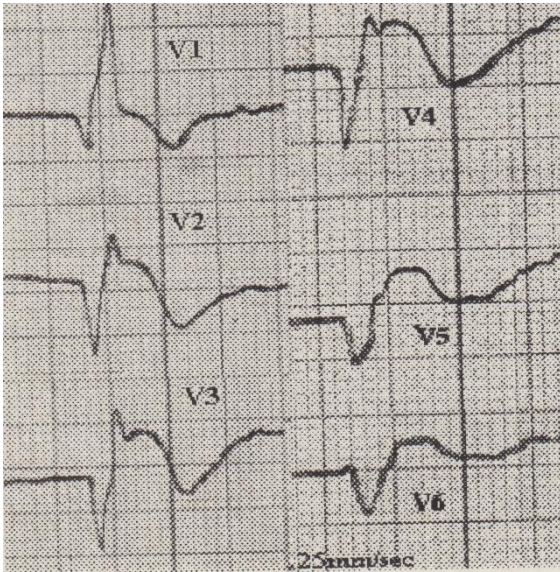
1. What changes ECG identified.
2. Most frequent causes these changes.

Sample answer:

1. Register transient SA blockade of the second degree, type II (without Samoilov-Wenckenbach periods). After two QRS complexes with a preceding P wave, there is a sinus pause of 2

RR distances, there is no ectopic activity of the atria and ventricles. Depolarization of the SA node occurred, as evidenced by the appearance of the next P wave "strictly on schedule" 2. SA blockade is often physiological in trained patients. The cause of SA blockade may be inflammatory and degenerative diseases of the myocardium.

#### Task 36.



A 69-year-old patient is in the hospital due to severe cardialgia.

1. Determine view violations conductivity.
2. What ECG signs explain cardialgia.

3. Establish a diagnosis.

Sample answer:

1. Complete RBBB:

- The QRS complex is widened in all leads (more than 0.12 seconds)
- rSR is recorded in V1, the ST segment is located discordantly

2. ECG signs, explaining cardialgia:

- Deep QS tooth in V2-V6

- ST segment elevation in V2-V6

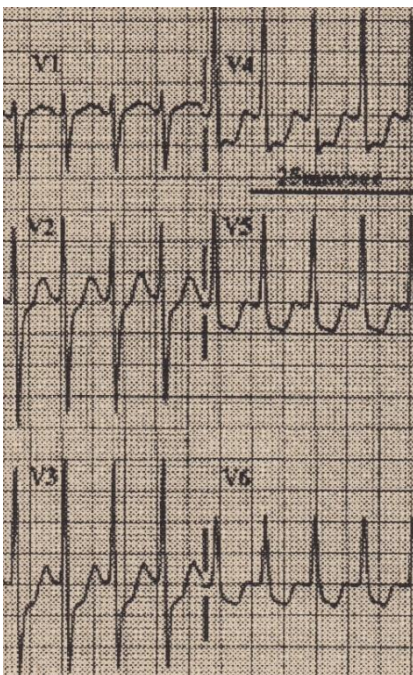
4. AMI of the anteroseptal region of the left ventricle, complicated by complete RBBB.

### Task 37.

The patient complains of sudden palpitations and chest pain.

1. Determine your heart rate.
2. Determine the type of heart rhythm disorder.
3. What ECG signs reflect pain syndrome.

Sample answer:



1. Heart rate is about 190 per minute ( $300/1.6$ , where 1.6 – number of large cells between RR)
2. SVT conditional availability retrograde path carrying out impulses. After teeth T late P waves are recorded
3. Horizontal ST segment depression greater than 2 mm in V4-V6 suggests coronary insufficiency as a cause of pain

### Task 38.



A 59-year-old patient complains of attacks of dizziness.

1. Set the type of arrhythmia.
2. What is the etiology of this arrhythmia.
3. Indicate emergency measures and further treatment.

Sample answer:

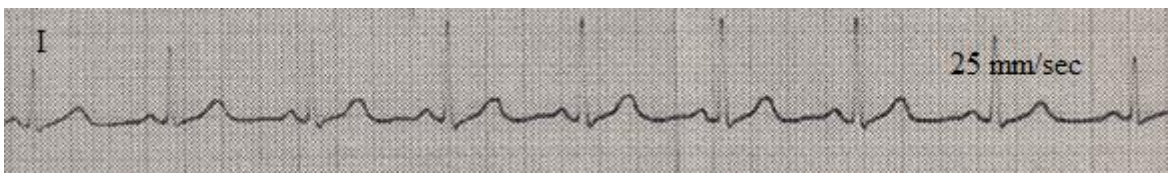
1. Tachycardia "pirouette" (Torsade de pointes) / This pathology is similar to VT, but has a high heart rate and is accompanied by a sinusoidal shape of the complexes. The episode of arrhythmia stops spontaneously, after a maximum of 10 seconds.

2. Reasons:

- Congenital or acquired long QT syndrome
- Taking antiarrhythmic drugs (quinidine, sotalol, amiodarone)
- Electrolyte imbalance

3. If the episode is prolonged, magnesium sulfate (bolus or infusion) is effective. It is necessary to correct electrolyte disturbances and discontinue previously prescribed antiarrhythmic drugs

### Task 39.



A 42-year-old patient is in the intensive care unit with a traumatic brain injury. He underwent a routine ECG.

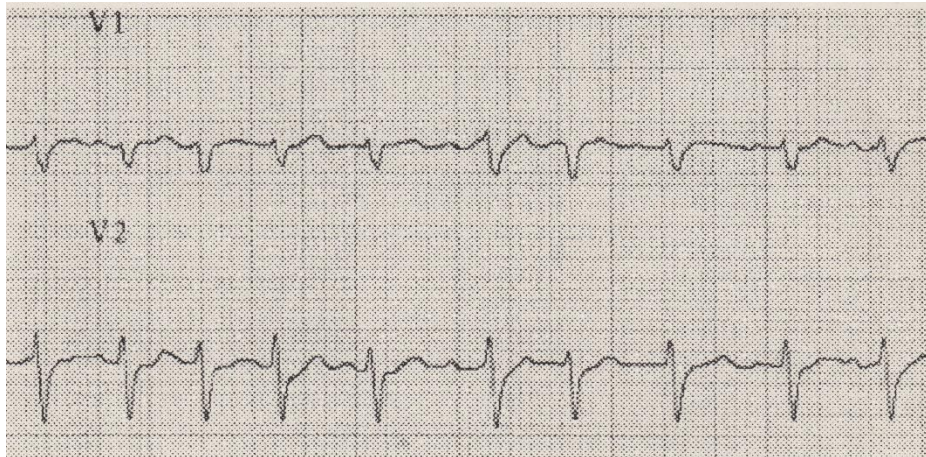
1. Indicate changes in the ECG.
2. Suggest the reason for these changes.

Sample answer:

1. The ECG recorded sinus rhythm (P wave precedes each QRS complex) with a heart rate of 75 per minute (300/4, where 4 is the number of large cells between RRs). However, the amplitude of the QRS complexes changes sinusoidally
2. Such changes are most often caused by artificial ventilation.



Task 40.



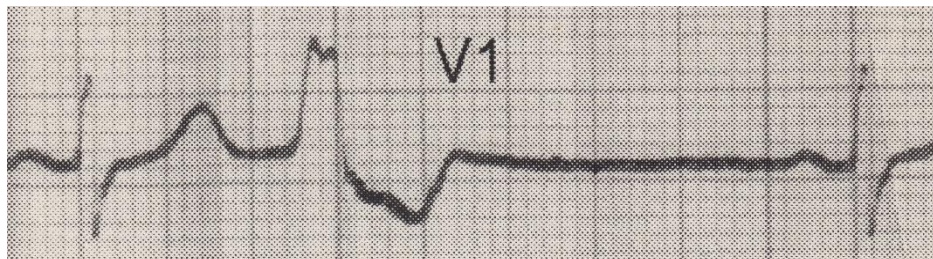
A 30-year-old patient noticed that she had an irregular pulse.

1. What is the patient's rhythm?
2. Specify the most likely causes of an irregular pulse.

Sample answer:

1. Frequent supraventricular extrasystole:
  - All complexes QRS are narrow and have the same shape
  - Teeth P precedes QRS complexes, but they are of different shapes
  - There is a change in the duration of the interval PQ
2. This arrhythmia most often has non-cardiac causes:
  - Stressful influences
  - Thyrotoxicosis

Task 41.



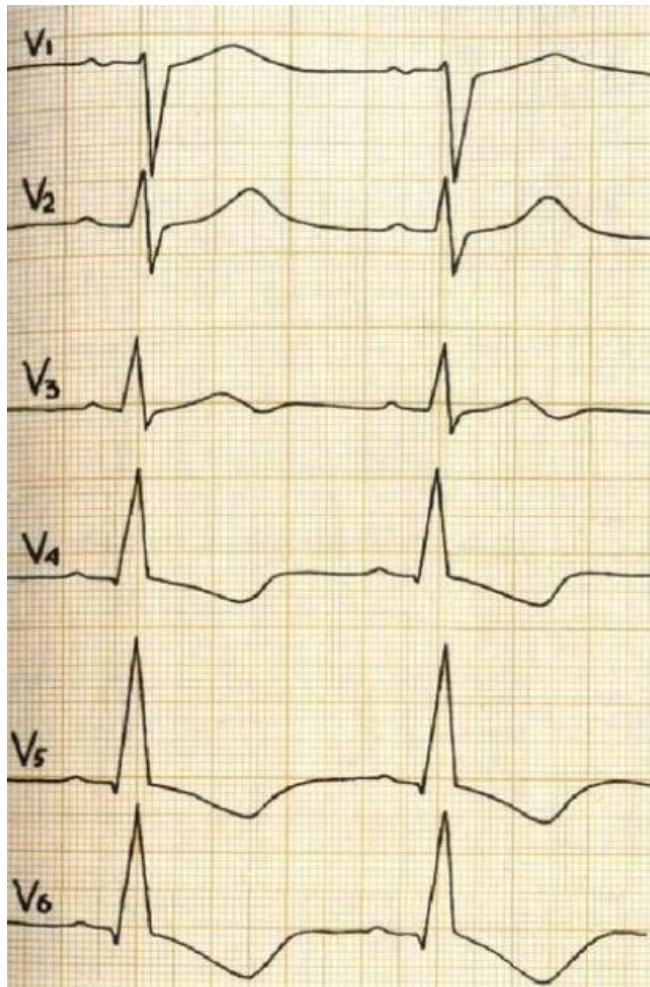
A 64-year-old patient notes an irregular pulse, which does not manifest itself clinically.

1. What is the name of the recorded change on the ECG.
2. Indicate the characteristic features of these changes.
3. Suggest the reason for these changes.

Sample answer:

1. The ECG recorded ventricular extrasystole. ECG signs:
2.
  - The QRS complex is widened (more than 0.12), deformed, discordant
  - There is no P wave because early ventricular depolarization occurred
  - The QRS complex is followed by a complete compensatory pause
3. This rhythm disturbance often has cardiac causes; the patient is advised cardiological examination, including HM.

Task 42.



cardiomyopathy

A 71-year-old patient lost consciousness while performing physical activity. During the examination, a rough systolic murmur is heard, most pronounced to the right of the sternum.

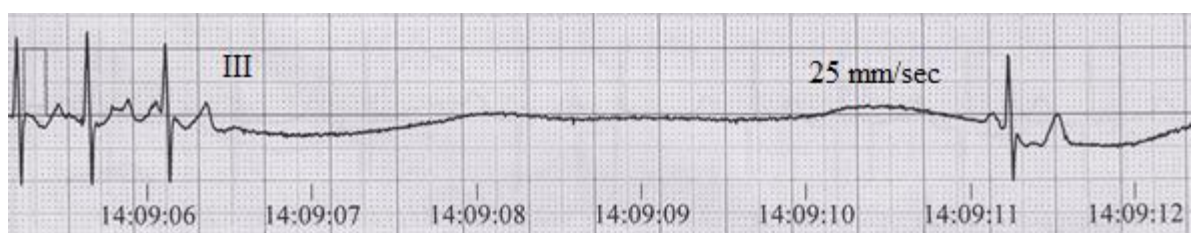
1. What changes registered on ECG.
2. Indicate the characteristic ECG signs of this pathology.
3. Damage to which parts of the heart could be the cause of these changes.

Sample answer:

1. LVH
2. ECG signs:
  - High R in V5-V6, more than in V4
  - Deep S wave in V1
  - Expansion of the QRS complex to 0.11 sec
  - Oblique depression of the ST segment in V5, V6, which indicates systolic overload
3. Severe aortic stenosis could have caused fainting during exercise in this patient. Another reason could be obstructive

hypertrophic

Task 43.



A 50-year-old patient is being treated in the endocrinology department. Recently, the patient has been experiencing semi-fainting conditions. The patient underwent HM.

1. What changes were detected on the ECG.
2. How long is the pause?
3. What causes the change in the ST segment.
4. What treatment measures need to be carried out for the patient.

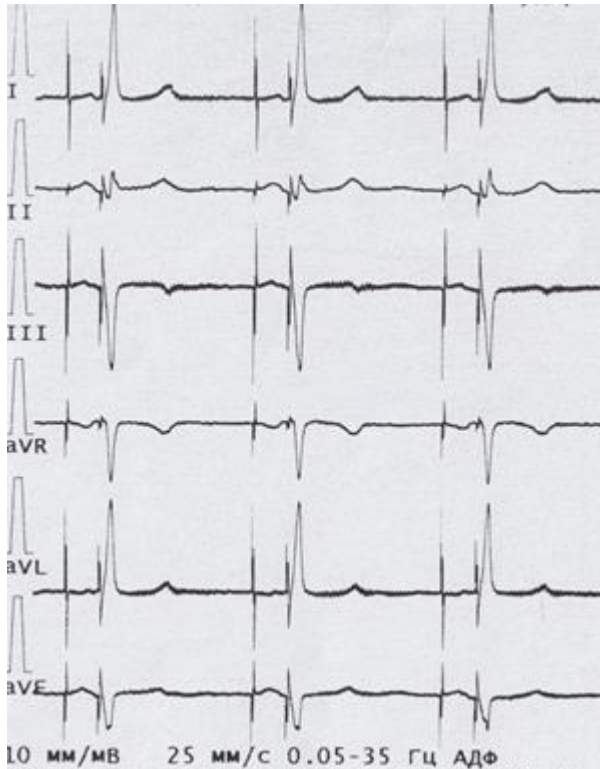
Sample answer:

1. AF with the appearance of sinus pause
2. Pause duration is more than 5 seconds (there is no activity of the atria and ventricles)
3. Depression segment ST over 2 mm more likely Total is posttachycardic
4. Required:



- Eliminate the possibility of overdose of antiarrhythmic drugs that used to monitor heart rate
- Consider implantation of IVR, taking into account the duration of the sinus pause.

#### Task 44.



A 70-year-old patient suffered transmural AMI in the anteroseptal region with progression to the lateral wall, complicated by cardiac arrhythmia. Surgical treatment of this complication was performed.

1. What features are present on the ECG.
2. Which patients are indicated for this treatment?

Sample answer:

1. Features of ECG:

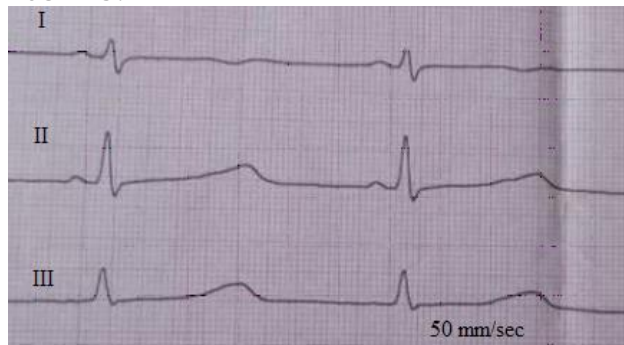
- Pacing spikes are visible before each P wave and before each QRS complex

- U sick two-chamber pacing (atrial pacing followed by ventricular pacing)

3. Heart function is more efficient with sequential depolarization of the atria and ventricles than with isolated cardiac stimulation. She

performed on patients with severe, extensive damage to the heart muscle.

#### Task 45.



A 48-year-old patient is being treated with antiarrhythmic drugs due to frequent ventricular extrasystoles.

1. What changes appeared on the ECG.
2. What reasons can lead to the appearance of this syndrome.

Sample answer:

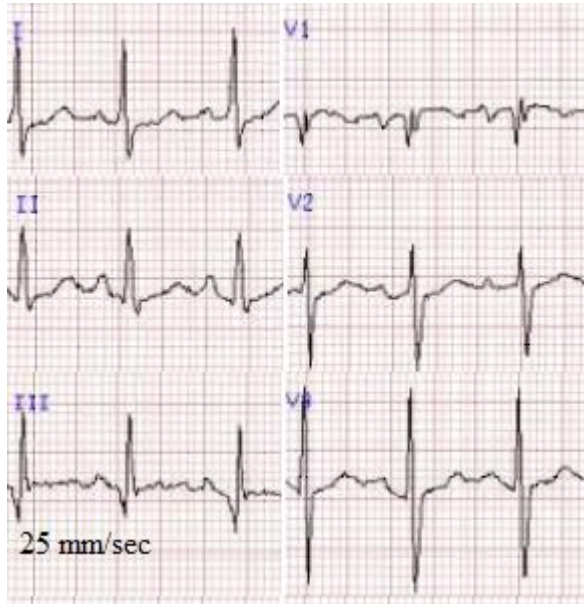
1. Long QT syndrome:

• Sinus bradycardia 54 per minute (600/11, where 11 is the number of large cells between RR)

- QT prolongation
- No changes in the QRS complex

2. This syndrome can be congenital or acquired, often as a result taking antiarrhythmic drugs, especially when they are combined

#### Task 46.



A 59-year-old patient in the trauma department suddenly developed severe shortness of breath and chest pain.

1. What changes on the ECG
2. Preliminary diagnosis.
3. What pathology needs to be treated differential

diagnostics.

Sample answer:

1. Changes on the ECG:
  - Pointed P wave in lead II
  - Deep S wave in lead I
  - Deep Q wave in lead III
  - rSr complex in V1 (incomplete RBBB)
2. Thromboembolism of the pulmonary artery, most likely of medium and small branches
3. Differential diagnosis is necessary with

AMI of the LV inferior wall (due to a deep Q wave in lead III)

#### Task 47.

List the main indicators characterizing the global systolic function of the left ventricle according to ultrasound data.

Sample answer:

LV ejection fraction, endocardial shortening fraction, stroke volume, minute blood volume.

#### Task 48.

Indicate the main methods for calculating LV ejection fraction based on echocardiography, their advantages and disadvantages, and differentiated use in patients.

Sample answer:

The main methods for calculating LVEF are in M-mode using the Teicholz method and in B-mode, the disk method. The advantages of the M-mode are simplicity and speed of execution; the disadvantages are that the geometry and disturbances of local contractility of the LV are not taken into account; a clear perpendicular between the ultrasound beam and the left ventricle must be maintained. The advantages of the disc method are that the contractility of all segments of the LV is taken into account as fully as possible, and violations of geometry and post-infarction remodeling are taken into account. The disadvantages of the method include the unreliability of the results in the absence of clear visualization of the endocardial-blood boundary and the duration of implementation.

#### Task 49.

List the main variants of disturbance of local contractility of the left ventricle. Sample answer:

Normokinesis, hypokinesis, akinesis, dyskinesis, aneurysm ("bulging" of the affected LV wall at the time of systole from the LV cavity).

#### Task 50.

Based on what parameters is the size of the left ventricle assessed? Sample answer:

The left ventricle is assessed based on a comprehensive assessment of end-diastolic size, end-diastolic volume of the left ventricle, as well as indexed



LV ICD and LV ICD, calculated as the ratio of absolute indicators to body surface area.

Task 51.

Define LV hypertrophy. What options for LV remodeling with hypertrophy of its walls do you know?

Sample answer: LV hypertrophy is an increase in the LV myocardial mass index and thickening of its walls. Hypertrophy can be eccentric and concentric. Concentric remodeling of the LV is also distinguished.

Task 52.

What indicator determines the nature of LV remodeling. How is it calculated?

Sample answer:

The nature of remodeling is determined by the relative thickness of the LV walls (RW), which is calculated as the ratio of the sum of the thickness of the posterior wall and interventricular septum to the end-diastolic size of the LV ( $RW = (IVD + LVAD)/LVED$ ). With an increase in LVMI, TVR less than 0.42 indicates eccentric LVH, TVR more than 0.42 indicates concentric LVH. An increase in TPV of more than 0.42 with normal values of LVMI indicates concentric remodeling of the LV.

Task 53.

What indicators characterize dimensions left atria. WITH what an increase in LA is associated with unfavorable outcomes.

Sample answer:

LA assessment is based on the anteroposterior size, LA volume, and LA volume index. LA dilatation is associated with the risk of developing atrial fibrillation, stroke and TIA, an increased risk of overall mortality after MI, an increased risk of death and hospitalization in patients with dilated cardiomyopathy, and is a marker of the severity and duration of LV diastolic dysfunction and the degree of increase in LA pressure.

Task 54.

What pathological conditions can lead to dilatation of the right ventricle.

Sample answer:

RV dilatation in adults is caused by a sharp increase in afterload on the RV due to pulmonary embolism and acute left ventricular failure. Dilatation of the pancreas can be an echographic sign of pancreatic infarction, as well as pancreatic dysplasia.

Task 55.

What pathological conditions can lead to right ventricular hypertrophy. Sample answer:

Right ventricular hypertrophy develops with a chronic increase in afterload (chronic cor pulmonale, heart defects with pulmonary circle overload (mitral stenosis, mitral regurgitation), severe CHF); predominantly RV hypertrophy develops

Task 56.

Based on what parameters is the pressure in the pulmonary artery calculated?

Sample answer:

Systolic pulmonary artery pressure (SPAP) is calculated based on the measurement of: the speed of tricuspid regurgitation using continuous wave Doppler, measuring the size of the right atrium

measuring the diameter of the IVC, assessing its decline depending on the phase of the respiratory cycle.

Task 57.

What are the main ones? vessels subject to mandatory research at echocardiography?

Sample answer:

Aorta, inferior vena cava, pulmonary artery.

Task 58.

On which valve is physiological regurgitation not allowed?

Sample answer:

Physiological regurgitation is not allowed on the aortic valve

Task 59.

What pathological conditions can be accompanied by aortic enlargement? Sample answer:

Aortic dilatation may be accompanied by long-term aortic regurgitation, aneurysm of the sinuses of Valsalva, bicuspid aortic valve, Marfan syndrome, dissecting aortic aneurysm, long-term arterial hypertension (more dilatation of the ascending aorta than of its root).

Task 60.

Define LV diastolic function. Sample answer:

Diastolic function of the heart can be characterized as the ability of the ventricles during diastole to accommodate the required volume of blood (end-diastolic volume) entering them from the atria.

Task 61.

What Doppler techniques are used to assess LV diastolic function?

Sample answer:

LV diastolic function is assessed using pulsed wave and tissue pulsed wave Doppler.

Task 62.

List the main variants of LV diastolic dysfunction. Sample answer:

Type I – impaired relaxation, type II – pseudonormal type of filling, type III – restrictive type of filling, IV SHOCK – irreversible restriction.

Task 63.

List the absolute indications for therapeutic TEE. Sample answer:

The absolute indications for the use of TEE are arrhythmias, during the occurrence of which, without the use of appropriate therapeutic measures, patients may develop life-threatening complications or sudden death. In the absence of the ability to effectively perform temporary endocardial pacemaker, the following are considered absolute indications for the use of therapeutic TEE:

- cardiac arrest;
- acute AV block with Morgagni–Adams–Stokes attacks;
- sharp bradycardia, accompanied by signs of circulatory failure;

- severe bradycardia that occurs during or after surgical interventions on the heart, as well as on other organs;
- brady- or tachycardic heart rhythm disturbances that are not eliminated by other therapeutic measures.

#### Task 64.

List the relative indications for therapeutic TEE. Sample answer:

Relative indications for therapeutic TEE are clinical situations during which therapeutic measures can be applied routinely, for example, termination of reentrant supraventricular tachycardia. TEE can be used at all stages of diagnosis and treatment of arrhythmias:

- in the work of cardiac emergency medical teams;
- in the work of the emergency department for emergency care;
- in intensive care and resuscitation wards;
- in cardiac surgery operating rooms;
- in specialized outpatient clinics for non-invasive EPI;
- in general clinical functional diagnostic rooms to change heart rate as a diagnostic cardioselective "stress test".

#### Task 65.

List the contraindications for TEE. Standard answer.

Contraindications to TEE are diseases of the esophagus (diverticulosis, tumors, structures, achalasia of the esophagus, esophagitis in the acute stage, varicose veins of the esophagus) and nasopharynx, the inability to insert the electrode into the esophagus (severe nausea, vomiting, etc.), acute period of myocardial infarction (if it is possible to use a temporary endocardial pacemaker), 2-3 degree AV block; heart defects with a pronounced disturbance of intracardiac (according to EchoCG) and central hemodynamics (clinical picture of heart failure above stage 2 or above functional class 2); cardiac aneurysm; acute stage of any disease (except for paroxysm of supraventricular tachycardia and atrial flutter); arterial hypertension above 220/120 mmHg. out of crisis; heart tumors (myxomas); pericarditis.

#### Task 66.

List the possible complications of TEE.

Standard answer.

Possible complications include: insertion of an esophageal electrode into the trachea instead of the esophagus; a burning sensation in the area of the esophagus, behind the sternum, the appearance of these sensations is mandatory when stimulation is turned on, and their absence in the patient should be associated with a malfunction of the equipment, the degree of sensation the patient experiences is usually low or easily tolerated; sensation of pain in the back associated with contraction of the spinal muscles; when the stimulator is turned on, effective stimulation of the diaphragm occurs, which is accompanied by its rhythmic contractions with the frequency that the stimulator gives at a given time, the patient may experience frequent hiccups or shortness of breath, and the doctor observes frequent contractions of the diaphragm; getting the electrode stuck in the nose is the most unpleasant complication of TEES, as it injures the patient and leads to loss of the electrode.

#### Task 67.

Name the main modes of stimulation when performing TEE.

Standard answer: the main stimulation modes include normrhythmic, accelerating, frequent, ultra-frequent and programmed stimulation modes.

Task 68.

Name the main indicators characterizing the sinus automatism function node.

Sample answer:

VVFSAU (time of restoration of sinoatrial node function) (corrected VVFSAU). ~~AVVFSAU~~ ~~AVVFSAU~~ measured as the interval from the last artifact of the electrical impulse of the stimulator to the beginning of the P wave caused by the impulse from the ACAS. This interval ("St-P"), defined in the II standard ECG lead, normally during TEE should not exceed 1470 ms (the time of conduction of the electrical impulse from the esophagus to the SAU is taken into account). CVVFSAU is defined as the difference between the maximum duration of the post-stimulation pause and the average duration of 10 initial cardiac cycles. Normally, it should not exceed 595 ms (the conduction time from the esophagus to the SAU is taken into account).

Task 69.

Name the main manifestations of sinus node dysfunction.

Sample answer:

Autonomic dysfunction: These disorders are secondary in nature and occur in young patients, athletes, and may be a consequence of increased intracranial pressure and other reasons. VDSU is, as a rule, benign in nature and in the absence of a pronounced clinical picture associated with bradycardia, it mainly requires dynamic observation with periodic repeated examinations by a specialist, TEEs and 24-hour Holter monitoring. Sick sinus syndrome (SSNS) - is organic in nature. In this category of patients, sick sinus syndrome occurs due to damage to the coronary arteries, in particular the artery directly supplying the sinus node, or myocardial damage of an ischemic or inflammatory nature and are a consequence of coronary artery disease, myocarditis or cardiopathy.

Task 70.

How is the differential diagnosis of organic and autonomic dysfunction of the sinus node carried out?

Sample answer:

"Drug denervation of the heart" is performed. Under continuous ECG monitoring, a beta blocker (obzidan) is slowly administered intravenously over 5 minutes at a dose of 0.2 mg/kg of the patient's body weight. Then, 10 minutes after the administration of obzidan, a 0.1% solution of atropine sulfate is administered intravenously over 1-2 minutes at a dose of 0.04 mg/kg of the patient's body weight. The test results are assessed 5 minutes after the end of drug administration. The maximum sinus rhythm after atropine administration is considered true sinus node rhythm (TSR). It has been established that the frequency of IRSAU depends on the age of the patient, so this value must be compared with the proper values, which are determined by the formula: Proper frequency of IRSAU =  $118.1 - (0.57 \times \text{age of the patient})$ . The IRSAU obtained during the study is considered normal if it varies within  $\text{DIRSAU} + 14\%$  in patients under the age of 45 years and within  $\text{DIRSAU} + 18\%$  in patients over 45 years of age. A normal IRSAU makes it possible to assume that the patient suffers from VDSAU (a functional decrease in the activity of the SAU or vegetative dystonia), and vice versa, if the IRSAU is less than expected, an organic lesion of the SAU (SSAD) is diagnosed.

### Task 71.

Define coronary angiography and list the main objectives of the study. Sample answer:

Coronary angiography is an invasive diagnostic study performed in a cath lab by injecting a contrast agent into the ostia of the coronary arteries under x-ray guidance. Goals of CAG: assessment of the coronary bed; determining treatment tactics and prognosis in patients with symptoms of coronary heart disease (CHD); studying the dynamics of coronary atherosclerosis.

### Task 72.

List the indications for planned coronary angiography.

Sample answer:

The following need to conduct a planned coronary angiography:

- Patients who have had a myocardial infarction
- Patients with suspected ischemic heart disease, whose work is related to the safety of others (airplane pilot, electric locomotive driver, etc.).
- Patients after successful cardiopulmonary resuscitation when there is reason to suspect CAD.
- Men, candidates for surgical treatment of heart valves or surgical (including endovascular) treatment for cardiac arrhythmias aged over 40 years.
- Women, candidates for surgical treatment of heart valves or surgical (including endovascular) treatment for cardiac arrhythmias aged over 45 years.
- Patients diagnosed with angina pectoris
- Patients with atherosclerotic lesions of the brachycephalic arteries according to ultrasonography.

### Task 73.

List the advantages and risks of transradial access when performing coronary angiography.

Sample answer:

Advantages: less incidence of bleeding from the access site; the possibility of more aggressive anticoagulant therapy; early activation and discharge; patient comfort.

Risks: longer procedure; larger volume of contrast agent; longer R-scopy time; longer time door - balloon with STEMI.

### Task 74.

List the indications for cardiac MRI: Sample answer:

Indications for cardiac MRI are:

- 1) Clarification of Echo-CG data (quantitative assessment of myocardial mass, ventricular volumes and contractile function);
- 2) Diseases of the aorta and pulmonary artery;
- 3) Heart tumors;
- 4) Assessment of myocardial viability and perfusion;
- 5) Congenital heart defects;
- 6) Diagnosis of congenital anomalies of the coronary arteries;
- 7) Diagnosis of inflammatory changes in the myocardium.

### Task 75.

List the main advantages of CT coronary angiography.

Sample answer:

The advantages of CT coronary angiography include:

- minimal invasiveness;

- no need for hospitalization of the patient;
- minimal risk of complications;
- the ability to diagnose pathologies in the early stages of development;
- determination of the type of atherosclerotic plaques
- the ability to evaluate the effectiveness of bypass surgery.
- identification of features or malformations of blood vessels.

**CRITERIA for assessing competencies and rating scales**

<b>Grade "unsatisfactory" (not accepted) or lack of maturity competencies</b>	<b>Grade "satisfactorily" (passed) or satisfactory (threshold) level of development competencies</b>	<b>Rated "good" (passed) or sufficient level mastering competence</b>	<b>Excellent rating (passed) or high level development competencies</b>
failure to student on one's own demonstrate knowledge when solving assignments, lack independence in application of skills. No confirmation of availability formation competencies indicates negative results of mastering educational disciplines	student demonstrates independence in application of knowledge skills and abilities to solve educational tasks in full According to sample given teacher, by tasks, solution which were shown teacher, it should be considered that competence formed on satisfactory level.	student demonstrates independent application of knowledge, skills and abilities in solving tasks, similar samples that confirms Availability formed competencies for higher level. Availability such competence on sufficient level indicates sustainable fixed practical skill	student demonstrates ability to complete independence in choosing a method solutions non-standard assignments within disciplines with using knowledge, skills and skills acquired as in the course of mastering this discipline, and adjacent disciplines should consider competence formed on high level.

***Criteria for assessing test control:***

percentage of correct answers	Marks
91-100	Great
81-90	Fine
70-80	satisfactorily
Less than 70	unsatisfactory

When grading tasks with multiple correct answers, one error is allowed.

**Interview assessment criteria:**

Mark	Descriptors		
	strength of knowledge	ability to explain (introduce) the essence of phenomena, processes, do conclusions	logic and subsequence answer
Great	strength of knowledge, knowledge of basic processes of the studied subject area, the answer is different depth and completeness disclosure of the topic; possession terminological apparatus; logic and consistency answer	high skill explain the essence phenomena, processes, events, do conclusions and generalizations, give reasoned answers, give examples	high logic And subsequence answer
Fine	solid knowledge main processes subject matter being studied area, different depth and completeness disclosure of the topic; possession terminological apparatus; free possession monologue speech, however one is allowed - two inaccuracies in the answer	ability to explain essence, phenomena, processes, events, draw conclusions and generalizations, give reasoned answers, give examples; however one or two inaccuracies in the answer are allowed	logic and subsequence answer
satisfactorily	satisfactory process knowledge subject matter being studied areas, answer, different insufficient depth and completeness of disclosure Topics; knowledge of basic theoretical issues. Several are allowed errors in content answer	satisfactory ability to give reasoned answers and provide examples; satisfactorily formed analysis skills phenomena, processes. Allowed several errors in content of the answer	satisfactory logic and subsequence answer
unsatisfactory	poor knowledge of the subject area being studied, shallow opening Topics; poor knowledge main issues theories, weak skills analysis of phenomena, processes. Allowed serious mistakes in content of the answer	inability to give reasoned answers	absence logic and sequences answer



**Criteria for assessing situational tasks:**

Mark	Descriptors			
	understanding Problems	analysis of the situation	solution skills situations	professional thinking
Great	complete implication problems. All requirements, declared task, completed	high benefit analyze situation, do conclusions	high benefit select method solutions to the problem, true skills solutions to the situation	high level professional thoughts
Fine	complete implication problems. All requirements, declared task, completed	benefit analyze situation, do conclusions	benefit select method solutions to the problem true skills solutions to the situation	residual level professional thoughts. one goes down - there are inaccuracies in reply
satisfactorily	astatic implication problems. majority requirements declared task, completed	satisfactory benefit analyze situation, do conclusions	satisfactory solution skills situations, falsity with choosing a method solutions to the problem	residual level professional thoughts. falls more a bunch of inaccuracies in reply or error sequences solutions
unsatisfactory	misunderstanding problems. legs requirements, declared task, not completed. no answer. Not there were attempts solve the problem	poor ability analyze situation	insufficient solution skills situation	missing